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October 10, 2012

VIA ELECTRONIC DELIVERY

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Room TWA325
Washington, DC 20554

Re: Notice of *Ex Parte* Presentations
WT Docket No. 12-69

Dear Ms. Dortch:

On October 5, 2012, Vulcan Wireless LLC ("Vulcan") representatives Scott Wills, Paul Nagle, Paul Kolodzy, Michele Farquhar, and Trey Hanbury, together with C Spire Wireless ("C Spire") representatives Benjamin Moncrief, Eric Graham, and Doug Hyslop, participated in a conference call with Nese Guendelsberger, Maria Kirby, Nicole McGinnis, Tom Peters, and Tom Tran of the Wireless Telecommunications Bureau ("WTB").

The participants reviewed the fundamental technical issue presented by the Commission in the NPRM: specifically, whether consumers would experience harmful interference if the Commission were to require 700 MHz B and C Block licensees to grant their customers the freedom to roam and interoperate with license holders in the 700 MHz A Block.[1] As explained in the attached slides, the overwhelming weight of the record evidence (and all of the field studies conducted) indicate that an interoperability requirement – and all of the attendant consumer benefits that it will generate – will *not* cause harmful interference to 700 MHz B and C Block licensees.

First, actual field tests revealed that Channel 51 signals are rarely, if ever, strong enough to adversely impact Band Class 12 devices. AT&T's laboratory tests to the contrary are contrived and appear designed to mislead. For example, in AT&T's recent field tests, which were submitted to the Commission on October 3, 2012, AT&T employed a highly unusual test environment in which LTE signals are exceptionally weak and Channel 51 or Lower E Block transmissions are exceptionally strong. This odd scenario is extraordinarily unlikely to occur anywhere other than the test labs of AT&T's technical consultants. In truth, buildings and morphology will attenuate both LTE and Channel 51 signals equally and, as a result, Channel 51/E Block signals are very likely to be weak where LTE signals are weak and vice versa. This reality – together with other factors enumerated in the attached presentation – prevents harmful interference from occurring under real-world conditions.

Second, multiple independent test measurements demonstrate that Band Class 12 devices perform substantially better than AT&T claims they do. Indeed, commercial Band Class 12 devices already exceed the performance specifications for Band Class 17 for blocking Lower E Block signals. In other words, a Band Class 17 device equipped with a Band Class 12 duplexer would perform better

[1] Promoting Interoperability in the 700 MHz Commercial Spectrum, *Notice of Proposed Rulemaking*, WT Docket No. 12-69, FCC 12-31 ¶ 5 (rel. Mar. 21, 2012).

than the 3GPP Band Class 17 performance specifications. For this reason, among others, harmful LTE device receiver blocking interference caused by Lower E Block transmissions is not a serious concern, even though it is one of the central objections to Lower 700 MHz interoperability by AT&T and its allies.

Third, implementing interoperability across the Lower 700 MHz band would impose no additional costs on licensees, handset manufacturers, or consumers of any consequence. The manufacturing of new interoperable mobile devices would require the replacement of a single piece of hardware, a duplex filter, and the marginal cost of using a Band Class 12 duplex filter instead of a Band Class 17 duplex filter is *zero* with scale purchasing. Similarly, the software update that would be required can be accomplished at no additional cost during the course of a carrier's routine maintenance. Existing mobile devices would be entirely exempt from any interoperability requirement and would continue to function as they currently do. As a result, the cost of interoperability approaches zero and is entirely inconsequential, especially in light of the immense consumer benefits that interoperability would achieve.

The parties concluded by noting that American consumers will suffer from increased costs, delayed broadband deployment, and slower innovation so long as two incompletely overlapping bands exist in the Lower 700 MHz band. Although a limited number of Band Class 12 devices are available, consumers will suffer as the devices lag the industry in the absence of sufficient scale to make routine production worthwhile.

Finally, while not raised during the meeting, Vulcan would like to call attention to the work of the Interoperability Alliance, which is a group of mobile broadband providers, consumer interest groups, and other advocates for Lower 700 MHz interoperability. The Alliance maintains a list of resources on its website, http://www.interoperabilityalliance.org. Among other things, the site provides links to press coverage about how the lack of interoperability in the Lower 700 MHz band has harmed consumers and competition alike.

Pursuant to Section 1.1206(b) of the Commission's rules, I am filing this notice electronically in the above-referenced dockets. Please contact me directly with any questions.

Respectfully submitted,

/s/ Christopher J. Termini

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The 700 MHz NPRM Requested Measurement Data

WT Docket No. 12-69 was established to:

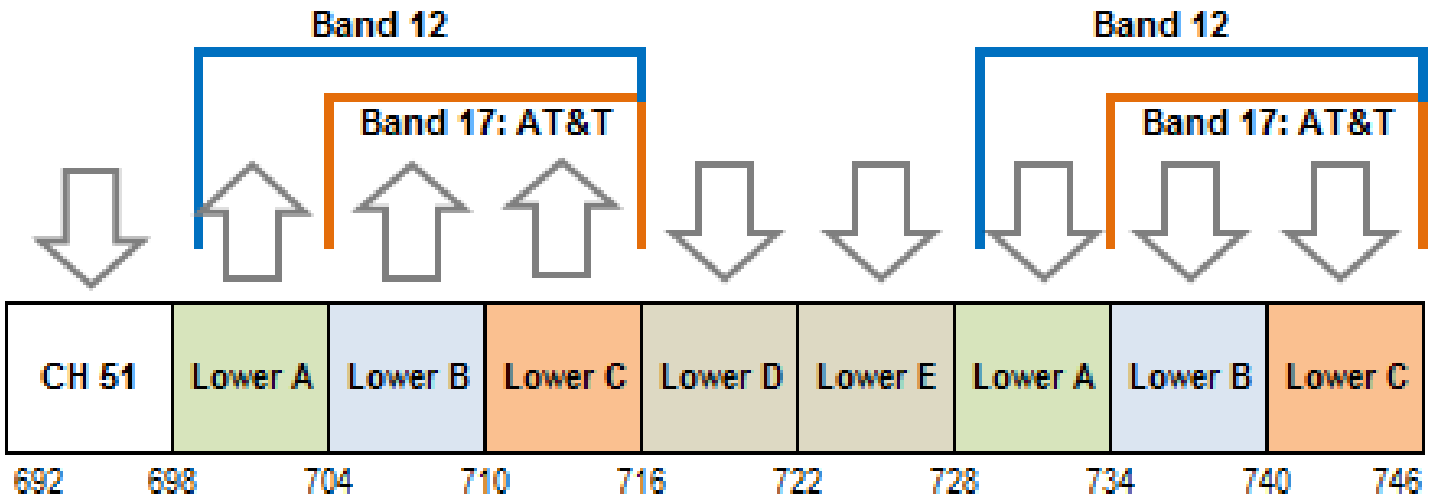
> "Evaluate whether the *customers of Lower 700 MHz B and C Block licensees would experience harmful interference* - and if so, to what degree - if the Lower 700 MHz band were interoperable." (NPRM at 5)

The scope is focused on devices:

> "We focus the scope of this proceeding to interference to Lower 700 MHz B and C Block operations that may *result from the adoption of Band Class 12 devices* by Lower 700 MHz B and C licensees, whether voluntarily or by regulatory mandate." (NPRM at 32)

The NPRM requested evidence of interference:

> "We ask interested parties *to submit* ***measurements and quantitative analyses*** regarding the *magnitude and extent of the interference risk* from adjacent Channel 51 and Lower Block E transmissions for Band Class 12 devices operating in the Lower B and C Blocks." (NPRM at 40)



3GPP Bands Covering the Lower 700 MHz Band

RF Environment in Commercial Systems

- The central question of the NPRM is whether interference to Band 12 devices might exist within commercial LTE systems.
- How Wireless Systems Work:
  - Commercial LTE systems are built to provide reliably strong signals outdoors. This ensures that the signals are strong enough to serve customers inside of buildings. Buildings reduce the strength of wireless signals.
  - Broadcast signals (E Block and Channel 51) are strongest outdoors, and less strong within buildings, attenuated by the same principles of physics as the LTE signals.
- AT&T's Experts Define a Mythical Environment:
  - AT&T's experts assume the worst case of a very weak LTE signal, as with a device deep inside of a building, and baseline that device performance in the presence of the strongest signal levels of a broadcast interferer outdoors.
  - This situation would never exist in an operational network.
  - Further, their analyses are based on hypothetical device performance, not actual devices.
- Actual Commercial System Environment:
  - The correct environment to consider is the LTE signal level available outside of buildings, and the broadcast signal levels in these same locations.
  - Device performance under these conditions is considerably better than that claimed by AT&T's experts.

Summary of Empirical Measurements

- Hyslop-Kolodzy and V-Comm provided the most complete test data of commercial LTE devices in the vicinity of Lower E Block and Channel 51 broadcast signals.

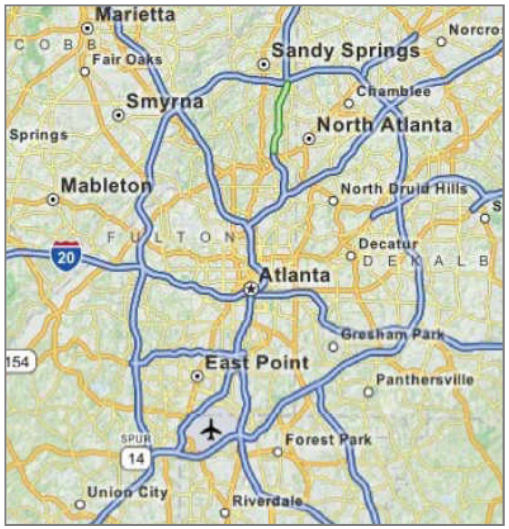
	Lower E Block		Channel 51	
	Lab Tests	**Field Tests**	**Lab Tests**	**Field Tests**
Hyslop-Kolodzy Report	Yes	Yes	Yes	Yes
V-Comm Report	Yes	Yes	Yes	Yes
AT&T Comments	No	No	Yes	No
Qualcomm Comments	No	MediaFLO	2 GHz	No

- The interoperability opponents' test data was flawed:
  - Qualcomm's Channel 51 tests used 2 GHz components, a configuration not representative of 700 MHz, and hypothetical, undocumented device performance assumptions.
  - AT&T's Channel 51 laboratory test plan specified inadequate control of emissions, which would invalidate the test results.
  - Neither AT&T nor Qualcomm tested devices to determine blocking performance relative to the Lower E Block.

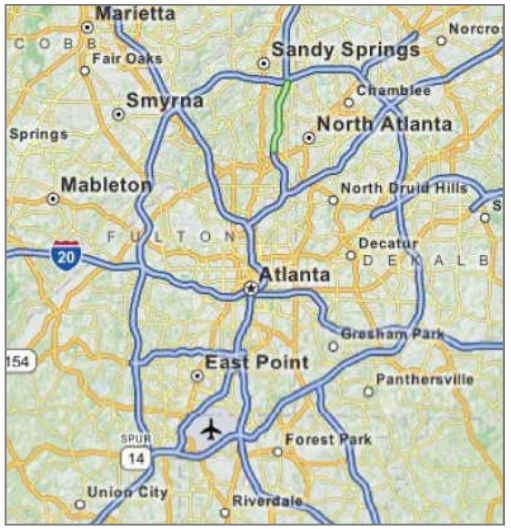
Notes: (1) two devices were tested in Hyslop-Kolodzy Report
(2) seven additional devices were tested in V-Comm Report
(3) one device was tested by AT&T

Measurements Show No E Block Interference

- The Hyslop-Kolodzy test report provided field measurements for:
  - Two LTE commercial systems (VZW and AT&T)
  - Several Lower E Block 50 kW towers of the streaming media service deployed by Dish Network
- These measurements documented the broadcast signal strength ***at the same locations as the commercial LTE measurements, throughout the market***.
- Hyslop-Kolodzy and V-Comm also measured LTE device performance in the presence of strong broadcast signals.
- Applying the commercial device performance to the RF environment in Atlanta demonstrates that no interference would result to Band 12 devices operating on the existing LTE systems.



Band 12 Interference Plot



Band 17 Interference Plot

Based on the empirical data in the record, commercial Band 12 devices would not experience interference near E Block towers.

Measurements Show No Channel 51 Interference

- Hyslop-Kolodzy and V-Comm measured LTE device performance in the presence of strong Channel 51 signals.
  - Several Band 12 and Band 17 devices were tested.
  - All results revealed that a Channel 51 signal would need to be unusually strong, greater than -13 dBm, to begin affecting Band 12 devices in the weakest LTE coverage.
  - As validated by the Atlanta measurements, such weak LTE coverage is only found within buildings or other obstructed areas, where the Channel 51 signal would be similarly weakened to well below -13 dBm.
- Hyslop-Kolodzy and V-COMM measured Channel 51 signal strength in Atlanta, Chicago, New Jersey, and Iowa, demonstrating that such strong Channel 51 signals rarely, if ever, occurred.
- The Hyslop-Kolodzy report also provided a simple operations workaround which would eliminate interference if it were to hypothetically exist, with no impact to cost, hardware, or software.

Based on the empirical data in the record, commercial Band 12 devices would not experience interference near Channel 51 stations.

Why the measurements make sense

- Why do Band 12 devices not experience interference? The answer is simple: commercial devices are designed to operate robustly in challenging RF environments.
- Channel 51 is not an unusual interference situation.
  - The 3GPP standard does not specify special protection from Channel 51 - the Bands 12 and 17 specifications are identical here.
  - AT&T's downlink band at 716-728 MHz poses the same interference mechanism as Channel 51, reverse PA IM.
    - Non-AT&T devices, seeing AT&T's downlink transmission in the D Block, would receive that signal at the levels raised by AT&T as a concern. Any IM would fully overlap with the device's receive channel.
    - AT&T, and Band 12 licensees, have not raised device interference as a concern for the new band at 3GPP because commercial devices provide adequate protection from reverse PA IM.
  - The 700 MHz power amplifier linearity is fully sufficient to protect the device from reverse PA IM. The device RF filter does not play a significant role in preventing interference from Channel 51 or D Block.
- To a device operating in Lower B/C, the Lower E Block is similar to the Upper C Block.
  - Verizon's Upper C Block (Band 13) downlink is immediately adjacent to the Lower C Block downlink.
  - Devices employing Band 12 or 17 may closely approach a Band 13 base station, and receive a strong interfering signal.
  - The device receiver provides better rejection of the second adjacent channel (E Block) than the adjacent channel (Upper C Block), making the E Block appear weaker.
  - The FCC rules limit the E Block ground-level power density to levels similar to that of LTE systems.
  - The FCC rules, combined with 700 MHz device receiver performance, adequately handle any broadcast E Block signals which might one day be deployed; the Band 12 or 17 filter does not play a significant role in managing the E Block signals.

Band 12 Devices Exceed Band 17 Specifications

- In the 3GPP standard, the Band 12 and 17 specifications differ only in the device blocking level to the Lower E Block.
  - Band 17 defines a stronger signal level that may be tolerated in E Block.
  - Band 12 commercial devices already provide protection exceeding this stronger signal level.
- All Band 12 devices tested exceeded the 3GPP blocking specification for Band 17.
- Stated differently, a Band 17 device equipped instead with a Band 12 RF filter would exceed the 3GPP Band 17 performance specifications.
  - The RF filter is the only band-specific component in the device, and is not necessary to protect the receiver from the E Block signals.
  - Therefore, all Band 12 and Band 17 devices are already handling any anticipated interference threats.
- Band 17 is not necessary to protect against harmful interference.

Conclusions

- The NPRM for 700 MHz Interoperability requested measurements and analyses assessing whether Band 12 commercial devices operating in the Lower B and C Blocks would experience harmful interference relative to a Band 17 device.
- The measurements in the record demonstrate that a Band 12 device would not experience interference in commercial LTE markets.
- The record further demonstrates that Band 12 devices exceed the 3GPP Band 17 performance specifications.
- Commercial Band 12 devices provide interference-free operation near Lower E Block and Channel 51 broadcast stations.
- Band 17 is not necessary to protect against harmful interference.

Interoperability Effect on Handset Capabilities & Requirements

With interoperability, “new mobile devices” would be technically capable of communicating across any network that deploys A, B or C-Block base stations. All “existing mobile devices” would be unaffected and continue to work as they do today.

Keys Components	Requirements Impact	Cost Impact
Antenna	No Change	None
Duplex Filter	Replacement component becomes common to all Lower 700 MHz mobile devices	None
Power Amplifier	No Change	None
Low Noise Amplifier	No Change	None
Base Band Hardware	No Change	None
Base Band Software	Band 12 vs Band 17 Software	None – Accomplished during a software flashcut

Interoperability Effect on Base-Station Capabilities and Requirements

With interoperability, Lower 700 MHz base stations that operate on either A, B or C Blocks can be upgraded, via software, to enable communications with mobile devices using Lower A, B and C Blocks.

Key Components	Requirements Impact	Cost Impact
Antenna	No Change	None
Duplex Filter	No Change	None
Power Amplifier	No Change	None
Base Band Hardware	No Change	None
Base Band Software	A one-time software upgrade to accept all A, B and C-Block Channel Numbering	None – Accomplished during routine software update cycle
Network Control	No Change	None

Interoperability Effect on Currently Deployed Networks Capabilities & Requirements

- With interoperability, current network designs and deployments would remain unchanged.
- All new Lower 700 MHz mobile devices would be technically capable of communicating with all A, B and C Block networks.

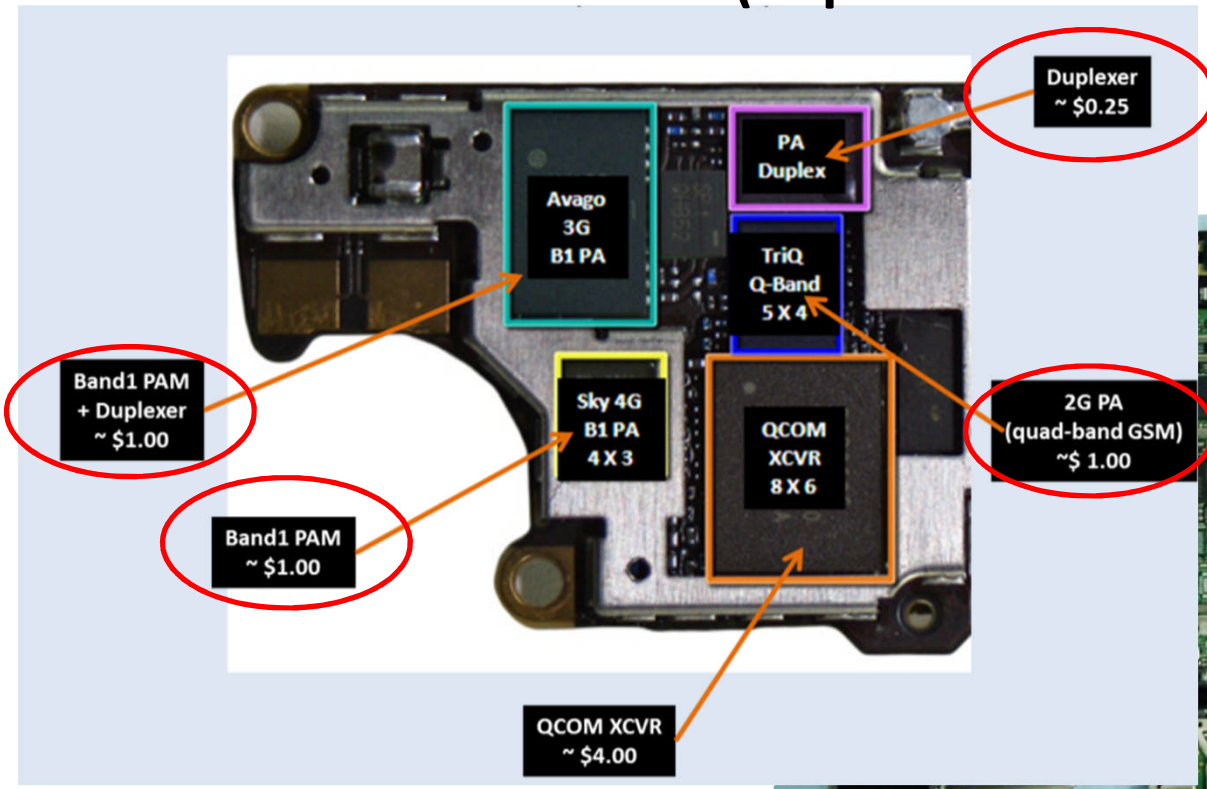
Key Components	Requirements Impact	Cost Impact
Cell Tower Proximity to Channel 51 Transmitters	Testing shows no changes required. AT&T claims that it will need to deploy some additional towers.	None. Band 12 and Band 17 3GPP specifications are currently identical for managing potential interference from channel 51 transmissions. AT&T claims unspecified costs of additional tower deployments.
Cell Tower Proximity to E-Block Transmitters	Testing shows no changes required. Current Band 12 LTE networks effectively manage high power E-Block deployment. AT&T claims that it will need to deploy some additional towers.	None. AT&T claims unspecified costs of additional tower deployments.

Backup

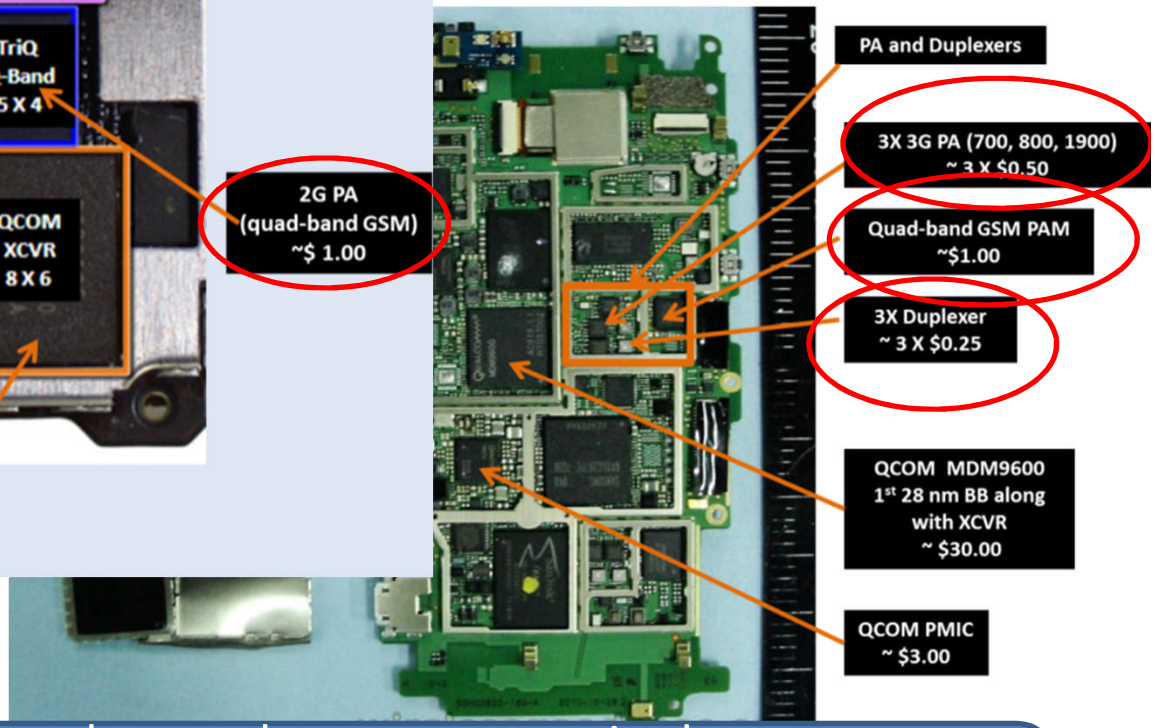
No Cost Increases Anticipated in Either Apple or Android Bill of Materials

(Impact of Band Class 12)

iPhone 4S

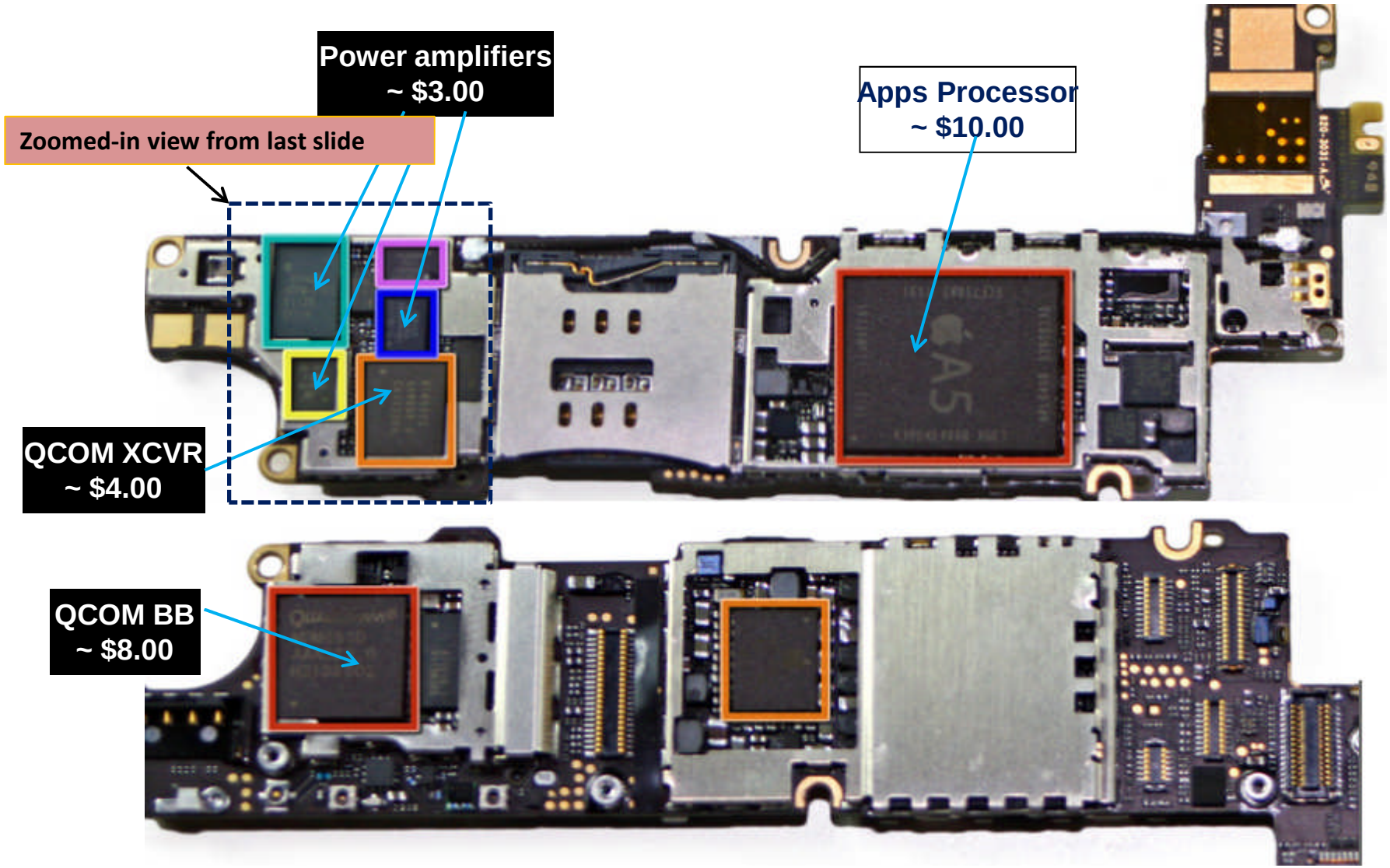


HTC Thunderbolt



Device Performance indicates that no changes are required except to simply broaden the duplexer to cover Lower A, B and C Blocks. However, if new filter (and potentially new Power Amplifier Module) components are required, similar BOMs component prices are all < $1 and, in quantity, have no cost impact.

There are also No Cost Impediments to Lower 700 MHz Interoperability



Device Component Bill of Materials for iPhone 4S

Device Component Bill of Materials for HTC Thunderbolt